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The Economic Viability of Upcycled Plastic Products: A Cost-Benefit Analysis of Women-Led Micro-Enterprises in India

Research Question - Can plastic-upcycling ventures sustain income for women artisans without permanent subsidy?

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Abstract

Summary
The economic viability of Project Sankalp, a women-led initiative is investigated and examined in this study. The project which creates employment opportunities for women artisans by the process of converting discarded plastic into reusable sleeping bags. Using a single case study approach, the research interviewed 86 artisans and had discussions with members of the project management team and observed the production process. A cost-benefit approach was used to assess the production costs and selling prices, artisans' earnings and the initiative's ability to function without the need for permanent subsidies.

An initial financial model estimated an average variable production cost of ₹390 for a sleeping bag, considering a selling price of ₹650, which would result in a contribution of ₹260 per unit. With an annual estimated fixed cost of ₹26,000, the break-even point was estimated at 100 units. Artisan earnings were evaluated against the statutory minimum wage in Rajasthan, and earnings reported by artisans in other upcycling ventures. Independent verification of the estimated artisan earnings of ₹8,000 to ₹8,500 per month was not available. Also, it could not be ascertained what proportion of income was derived from sale of units, versus grants and donations, due to limited access to financial records.

The study concludes that the potential for the integration of environmental and social benefits with commercial activities is demonstrated by Sankalp, but evidence to confirm the initiative's ability to operate with permanent financial support and provide fair earnings to artisans is needed.

I. Introduction

Background of the topic

There has been a substantial increase in the generation of plastic waste mainly due to India's increasingly growing consumption of plastic products. This has not only created significant challenges for resource utilization but also waste management. As reported by the Ministry of Environment, Forest and Climate Change (MoEFCC), there has been an approximate increase in India's annual plastic waste generation to 4.13 million tonnes in 2020-21 from 1.57 million tonnes in 2016-17 which represents an increase of approximately 163% in a duration of 4 years.

This pressing issue has also been evident at the state level. The Annexure 1 of the MoEFCC's July 2023 reports that Rajasthan generated 104,704.383 tonnes per annum (TPA) in 2018-19, declining to 51,966 TPA in 2019-20 before rising to 66,324 TPA in 2020-21. Such an increase of 27.6% in the latest reporting year throws light upon the continuing need for effective plastic waste recovery.

Plastic upcycling, transforms discarded plastic waste into higher-value products. This offers a complete and sustainable alternative to standard plastic disposal while retaining the economic value of waste. Hence, this backs up the principles of a circular economy which promotes the reuse of resources and aims to reduce wastage of materials. Moreover, curating and organising upcycling activities through women-led micro-enterprises creates income-generating opportunities for women artisans and promotes sustainability at the same time. However, their long-term impact heavily depends on the fact that product revenues can cover operating and production costs without the need for continuous financial assistance. This inaugurates the economic rationale for examining whether such enterprises can sustain women's income without permanent subsidies.

Existing Research

The informal waste sector plays an important role in sorting, collecting, aggregating and supplying recyclable materials to processing recyclers and facilities, upon which India's plastic waste management system relies substantially. As reported by CII, Saahas and WWF-India (2023) report, informal waste workers collect an approximate of 20-30% of India's total plastic waste. The movement of discarded plastic through the recycling value chain is facilitated by the sector which comprises waste collectors, aggregators and small-scale enterprises, often working beside formal municipal waste management systems.

Women embody a significant role in this process, especially in the sorting and collection activities. The investigation highlights that women take on approximately 40% of sorting activities and 10% of collection activities. However, their economic contribution fails to be reflected equally in their earnings. According to the worker study, despite having the same working hours, men make an average of ₹2,200 more per month than women, a drastic 21% difference. The division of labour is partially to blame for this discrepancy, since women typically perform lower-paid collection and sorting tasks while males are more often engaged in higher-paid transportation and loading tasks.

The economic activity of small waste-management businesses is also highlighted in the report. According to its survey of 54 businesses, the average monthly revenue was roughly ₹1.05 lakh, with monthly earnings ranging from ₹5,000 to ₹5.5 lakh. These results show how different informal garbage firms are in terms of their operational scale and ability to generate income. However, operating expenditures, labour costs, and material procurement must all be taken into account; income alone does not determine profitability.

Together, these findings demonstrate gender-based wage disparities and significant variation in firm earnings while establishing the informal plastic economy as a current source of employment and commercial activity in India. They offer a starting point for examining whether women-run plastic-upcycling businesses might turn waste recovery into profitable sources of income.

Research Gap

Research already conducted on women's self-help group (SHG) businesses offers important insights into the financial performance and difficulties faced by Indian women-led microbusinesses. Based on 73 nano-group businesses in Bhatapara, Chhattisgarh, the LEAD at Krea University (2025) study reports a median monthly revenue of about ₹11,500. Inadequate operational capital (43%), insufficient investment capital (37%), and restricted credit availability are among the obstacles to business expansion that are identified. Additionally, just 1% of individual nano-firms and 19% of group enterprises had officially registered their businesses.

However, rather than focusing on plastic upcycling, the study mainly looks at businesses engaged in both agricultural and non-agricultural operations, such as food manufacturing, tailoring, and handicrafts. As a result, it offers little information about the particular economics of turning waste plastic into items that may be sold. Specifically, the expenses associated with gathering and processing plastic, labour needs, product costs, profit margins, and reliance on outside subsidies are still not well studied.

This raises questions about whether women-led plastic-upcycling businesses can make steady profits and continue to be financially sustainable in the absence of ongoing subsidies. Through a cost-benefit analysis of these businesses, the current study fills this gap (LEAD at Krea University).

Research Question and Objectives

A social enterprise's ability to create enough generated revenue to pay running costs while still achieving its social goals is what determines its financial sustainability. According to Powell, Gillett, and Doherty (2019), social companies need to strike a balance between social value generation and commercial sustainability. Their study emphasises the difficulties of relying too heavily on grant funding and the value of having a variety of sources of income in order to lessen financial vulnerability. Using this paradigm as a foundation, this study investigates the financial sustainability of Project Sankalp, a women-led project that turns waste plastic into eco-friendly sleeping bags. The main inquiry for this study is:

1. **Determine production costs:** calculate the cost of producing a single upcycled plastic sleeping bag, including material, labour and operational expenses.
2. **Establish the break-even point:** calculate the minimum number of sleeping bags which must be sold in order to cover total operating and production costs.

3. **Evaluate artisan earnings:** Study the income which is generated by women artisans and then proceed to compare it against the applicable minimum-wage benchmark.
4. **Evaluate financial sustainability:** Assess the contribution of product sales relative to subsidies and grants to determine the enterprise's ability to operate without permanent external financial support.

These goals offer a quantifiable framework for assessing whether plastic upcycling can support women artisans' sustainable livelihoods while upholding the business's social and environmental goals.

II. Methodology

This study examined Project Sankalp's plastic-upcycling operations in 2025-2026 as a single case study. The main contributors were around 86 female craftsmen who worked in various areas to make sleeping bags made of recycled plastic. The craftspeople, who ranged in age from roughly 30-40, were self-employed. All 86 participants were interviewed one-on-one to learn more about their work schedules and monthly income. A phone call with the project manager yielded further primary data that shed light on the initiative's operations and production activities. In order to monitor the sleeping-bag production process and comprehend the tasks performed by the artisans, site visits were also conducted. The study used primary data from direct production observations, management conversations, and interviews with artisans. To find pertinent data without employees, business operations, and financial performance, the worker and enterprise questionnaires found in Annexes 3 and 4 of the CII insights report (2023) were utilised as reference frameworks. The study relied on information directly from participants and project management instead of independently checked purchase, sales, or payment records because access to formal financial and operational records was not accessible.

Design And Approach

In order to evaluate the financial and social viability of Project Sankalp's plastic-upcycling program, the study uses a single-case study design. The relationship between production costs, revenue, and income created for women craftsmen is examined using a quantitative cost-benefit method. Key stakeholders include craftspeople, plastic suppliers, NGO/donor buyers, and sleeping-bag beneficiaries. The scope is a single year of operations (2025-2026). The analysis takes into account both the results produced and the resources used (inputs), such as raw materials, thread transportation, and artisan payments, in accordance with the Cabinet Office's SROI framework. This offers a foundation for assessing the initiative's ability to continue operating while providing its participants with social benefits.

Data Collection

Individual interviews with the 86 female craftsmen, conversations with the project manager, firsthand production observations, and accessible project records will all be used to gather data. Each result will be paired with quantifiable indicators and a suitable source of evidence in accordance with the Cabinet Office's SROI methodology.

Cost information: Purchase records, receipts, and project spending records will be used to determine the cost of raw plastic collection, thread, other materials, labour, stitching, and transportation. Information will be cross-checked through artisan interviews and conversations with the project manager in cases where records are not available. While shared expenses will be distributed proportionately based on the quantity of sleeping bags manufactured, direct costs will be given to each individual bag.
Income information: Each artisan's monthly payments will be gathered through one-on-one interviews and compared to existing payment records. This will determine the revenue produced by the project.
Social outcome data: Production and distribution records will be used to track the number of sleeping bags made and distributed as well as the amount of recycled plastic (kg). The initiative's social and environmental benefits will be gauged by these metrics.
When trustworthy estimates are available, measurable outcomes will be given monetary values using pertinent financial proxies in accordance with the SROI technique. To prevent exaggerating the impact of the effort, data restrictions and assumptions will be recorded.

Data analysis

Unit cost, contribution margin, and break-even analysis will be used to assess Project Sankalp's financial feasibility. 86 female artisans who participated in the campaign are included in the study's sample.

For the purpose of financial modelling, the estimated variable cost of producing one sleeping bag is ₹390, thread and other materials (₹110) comprising plastic collection and processing (₹35), artisan stitching payments (₹180),

transportation (₹45) and packaging (₹20). Assuming an average selling price of ₹650 per bag, the contribution margin is:
Contribution Margin = ₹650 - ₹390 = ₹260 per bag
Assuming annual fixed operating costs of ₹26,000, the break-even volume is calculated as:
Break-even Volume = ₹26,000/₹260 = 100 sleeping bags
This means that in order to cover the estimated fixed and variable expenditures, 100 bags would need to be sold per year.

Three situations will be examined in a sensitivity analysis:

1. **Purchasing plastic** would result in higher variable expenses and a smaller contribution margin than accepting donated materials.
2. **Selling price:** Lowering the selling price from 650 to 600 would raise the break-even volume to about 124 bags while lowering the contribution margin to 210.
3. **Artisan compensation:** By raising stitching payments from ₹180 to ₹220 per bag, variable expenses would rise to ₹430, lowering the contribution margin to ₹220 and raising the break-even volume to roughly 119 bags.

Lastly, the broader economic and social returns in relation to the investment will be evaluated using the benefit-cost ratio (BCR) and net present value (NPV). Sensitivity analysis will determine how the initiative's financial viability is affected by shifts in manufacturing costs, selling prices, and artisan payments.

III. Results

Primary Findings

Project Sankalp's financial research looked at the repurposed plastic sleeping bags' production cost, selling price, contribution margin, and break-even volume. The variable production cost was ₹390 per bag, with an expected selling price of ₹650, according to the preliminary financial calculations. Each sale helped to recover fixed operational costs, as seen by the contribution margin of ₹260 per bag.

The break-even volume was calculated using an assumed yearly fixed cost of ₹26,000:
Break-even volume = 26,000/650-390 = 100 bags

Therefore, Sankalp would require to sell an annual amount of 100 bags annually in order to cover its estimated costs. The initiative's ability to reach operating break-even depends on whether current orders surpass this threshold.

Another Indian plastic-upcycling company, EcoKaari, offers a helpful contrast in terms of pricing and profitability. Upcycled plastic bags are among its offerings; costs start at about ₹1,200. Its established manufacturing methodology, business relationships, and employment of about 125 weavers across three locations are also highlighted in the YourStory report from May 2025. The monthly salary for women involved in its Ballari business was between ₹8,000 and ₹15,000. This illustrates how plastic upcycling can help women's livelihoods and business activity.

This comparison offers a benchmark for assessing Sankalp's pricing, production strategy, and capacity to produce long-term artisan revenue.

Group/category comparisons
Cace et al.'s(2026) Analysis of the revenue structures of 121 Romanian social businesses emphasises the significance of striking a balance between generated income and outside investment. An average of 47.3% of total revenue came from EU funding, followed by market sales (31.6%), individual donations (9.2%), and government grants (7.5%). Only 19% of organisations received less than 20% of their revenue from EU financing, while 25.6% of organisations earned more than 70%. These results show how much social companies can rely on outside funding.

The study also discovered that the likelihood of closure was about doubled for groups that received more than 50% of their income from EU financing (HR = 2.18, p = 0.002). Their three-year survival rate was 64.4%, while that of organisations with less reliance on EU money was 81.4%. This implies that a higher dependence on outside funding could lead to financial fragility in the event that funds are taken away.

This comparison serves as a foundation for analysing two scenarios for Project Sankalp. Production and operating costs may be supported by outside funding with ongoing grants and donations. However, in the absence of subsidies, sales of sleeping bags and large orders would have to pay for these costs and sustain payments to artisans. Sankalp's precise reliance on grants and its capacity to function without subsidies could not be determined due to the lack of comprehensive revenue and expenditure records. Nevertheless, the comparative findings imply that strengthening the revenue earned and minimising or reducing dependence on a single funding source are crucial in order to maintain long-term financial sustainability and stability.

Secondary Comparisons (artisan income)

The expected monthly artisan income for Project Sankalp is between ₹8,000 and ₹8,500 for comparison study. Since the individual income statistics were not available for analysis, this is an illustrative estimate rather than a confirmed interview conclusion. The minimum monthly pay benchmarks in Rajasthan are ₹7,410 for unskilled workers, ₹7,722 for semi-skilled workers, and ₹8,034 for qualified workers. As a result, the anticipated pay range is about comparable to the skilled-worker rate and higher than the unskilled and semi-skilled benchmarks.

The lower end of the profits recorded by female craftsmen at EcoKaari's Ballari activities, which varied from 8,000 to 15,000 per month, is likewise in line with this estimate. However, it cannot be determined that Sankalp satisfies the legal minimum wage standards in the absence of confirmed payment records and details regarding the craftsmen' working hours. However, the comparison indicates that its anticipated artisan earnings are roughly equivalent to those of another Indian plastic-upcycling business.

Key/Unexpected Findings (social value)

Beyond its financial results, Project Sankalp creates social and environmental value by employing 86 women craftsmen and turning waste plastic into sleeping bags. Over 100kg of discarded plastic have been turned into useful products by the effort, helping to reduce trash while giving sleeping bags to those in need. These results extend its influence beyond sales revenue.

The program might also help participating women become more self-assured and financially independent, but these advantages shouldn't be valued in monetary terms without proof. Additionally, the NSW Department of Communities and Justice (2020) states the full social impact of an initiative should consider displacement. This means that when assessing the social impact of a program like Sankalp, it's important to consider what may have improved if the program didn't exist. It's also important to assess the contribution of other organizations and whether the program displaces other benefits. In the absence of evidence to the contrary, a default deadweight of approximately 5% may be applied. Assessing attribution should be done for each outcome of a program.

So, while Sankalp may not have significant direct financial returns, its benefits in reducing waste and improving livelihoods could result in a case for continued support. However, more information would be needed to determine the extent of social value this program creates, including the number of artisans benefitted, the plastic waste diverted, and any changes in artisan wellbeing.

IV. Discussions and Conclusions

Interpretation

Project Sankalp may be financially and socially sustainable, the study found. However, to fully support the social mission, the project may have to place less focus on commercial income. The project combines the upcycling of plastics with employment of 86 women artisans and produces sleeping bags for the needy.

Income diversification is needed to achieve the balance. Regular bulk orders from NGOs and institutional buyers offer more assurance and regularity than one-time donations or orders from individual buyers. Thus, reliance on NGOs is a risk for Sankalp. However, consistent income from bulk orders may help Sankalp manage running costs and offer steady payments to the artisans. Similar to Sankalp, other social enterprises focus on building several income streams to reduce financial uncertainty, according to Powell, Gillett and Doherty (2019)

Along with the other major challenges, focus must also be placed on achieving consistent quality of products and ensuring effective leadership. The pressure on leadership to maintain and develop sustainable markets is also critical. The sustainability of Sankalp hinges on its ability to separate its social objectives from its commercial objectives.

Comparison with previous studies

Sankalp's model is largely women-led and includes waste recovery and skill development with a focus on income generation. The Mitigation Action Facility (2025) states that over 180 informal workers received textile upcycling and mat-making training and earned between ₹400 and ₹500 per day with home-based production. In Panaji, 30 women produced and sold upcycled cloth bags. Compared to these projects, Sankalp works with 86 women to upcycle discarded plastics into sleeping bags.

In terms of potential earnings, Sankalp's illustrative monthly income estimate of ₹8,000 to ₹8,500 broadly reflects the opportunities reported in the other initiatives, although the ₹500 per day earning level was likely an upper limit, not an average. The UNDP-GEF Small Grants Programme's case study of Bhopal also illustrates how the development of plastic waste recovery activities significantly improved the wages of waste pickers. These examples also show that training and improved waste management, as well as access to markets, strengthen women's livelihoods.

Sankalp adopts a similar 'livelihoods' approach to the Bhopal case, and differs in the product, scale and model of production. Based on the above, Sankalp has the potential to not only recover plastic waste, but provide women with a sustainable, economic means of livelihood through increased production.

Practical Implications

The results indicate that projects like Sankalp require more improved market access and pricing in order to be financially viable at scale. NGOs and CSR organizations should provide support to women artisans in starting businesses, including training and equipment, while avoiding long-term grant reliance. Outcome-based funding by donors should focus on measurable results, including the quantity of plastic recovered, the number of women employed and improvements made to the artisans' livelihoods.

Women-led upcycling social enterprises need procurement partnerships to purchase their recycled products at prices that cover the costs and value the labour. This ensures a steady market and helps businesses fulfill their EPR obligations. Women-lead social enterprises need access to raw materials and a market for their recycled products. Women-led upcycling social enterprises are well positioned to meet both needs. Positive procurement and outcome-based funding, along with fair pay, could allow Sankalp to protect and scale their initiatives while meeting the needs of women artisans.

Policymakers should integrate women informal waste pickers in circular economy supply chains as formal workers through fair trade practices and create social protection for the women. This combination should be coupled with outcome-based financing and guarantees to purchase. Policymakers should also align Extended Producer Responsibility (EPR) and other circular economy policies, sustainable procurement and funding to meet both environmental and social outcomes. This approach should be adopted to achieve the UN Sustainable Development Goals (2030), in combination with fair pricing and purchasing, for the livelihood of women artisans to be secured while scaling initiatives like Sankalp.

V. Limitations and Future Research

This investigation has a few limitations. Firstly, it assesses only one enterprise which is Project Sankalp, with 86 women artisans which limits generalizability of its findings compared to other women-led upcycling ventures. The assessment of long-term financial sustainability and the seasonal variations on demand by a rather short study period of 2025-2026.

Secondly, the investigation primarily depends on a self-reported dataset through interviews, as operational and formal financial records were not available. Subsequently, artisan earnings, revenue estimates and production costs could not be verified independently either. The valuation of social benefits also involves assumptions regarding attribution, deadweight and the monetary value of non-financial outcomes. The NSW Department of Communities and Justice (2020) highlights that these assumptions can influence SROI results and should be tested through sensitivity analysis.

Further research should investigate multiple women-led upcycling enterprises coming from various regions and shall track their financial performance, social outcomes and artisan earnings over longer periods. Access to verified financial records and more systematic measurement of social benefits would improve the reliability of cost-benefit and SROI assessments.

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