

Program Profile

Program	Program name	ECO PAPER INNOVATION FROM FASHION WASTE: A SUSTAINABLE TRANSITION TOWARDS CIRCULAR ECONOMY.
	Category	A3

Summary of Program

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Abstract of Program	This study presents an innovative and environmentally responsible approach to handmade paper production by utilizing recycled textile waste. Specifically, garment cutting waste as the primary raw material. With the rapid expansion of the global textile and apparel industry, enormous quantities of pre-consumer waste, such as fabric trimmings and cutting scraps, are generated and often discarded in landfills or incinerated, contributing to environmental degradation and resource depletion. This research seeks to address this growing problem through sustainable waste management and material upcycling. By converting textile waste into functional handmade paper, the study not only offers a practical solution for waste minimization but also contributes to the conservation of natural resources such as wood pulp and water. Five unique combinations of textile and paper waste were developed and evaluated, each incorporating different ratios and types of discarded fabric and post-consumer paper. The aim was to determine which composition would yield the best balance of strength, texture, visual appeal, and printability key factors for viable commercial applications. This study not only demonstrates the technical feasibility of upcycling textile waste into value-added products but also underscores the broader environmental and economic implications. By adopting such circular production methods, industries can reduce their ecological footprint, promote green entrepreneurship, and move closer to achieving sustainable development goals. The findings offer valuable insights for policymakers, manufacturers, and sustainability advocates seeking scalable, low-cost alternatives to traditional paper-making practices.

Details of Program

Planning

Objectives	Long-term Goals	Build a permanent eco paper unit that converts fashion waste into market ready paper and packaging within five years.
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		Divert at least one hundred tons of pre and post-consumer textile waste from landfills over five years. Reach break-even through sales to campus, local brands, and printers, and reinvest profits into student led research. Publish methods, open lab manuals, and at least eight peer reviewed outputs on fiber selection, pulping, and paper performance. Train five hundred students and workers on circular production and create a pipeline for green jobs. Form a city-wide network with factories and municipalities to scale collection and sorting for textile to paper streams. Demonstrate carbon and water savings through annual life cycle audits and share results with policymakers.
	Short-term Targets	Set up a pilot pulping and sheet forming line on campus with safety and QA protocols. Sign two MOUs with nearby garment factories for regular supply of cotton rich cutting waste. Produce and test at least two tons of paper in the 80 to 200 gsm range for notebooks, bags, and packaging. Achieve target properties. Tensile index within fifteen percent of commercial recycled paper. Good printability and ink holdout. Develop three product prototypes. Student notebooks, hangtags, mailer envelopes. Train fifty students through a hands-on course and document standard operating procedures. Run a small LCA baseline for energy, water, and emissions per kilogram of paper. Create a business model canvas and pricing sheets. Identify two anchor buyers in campus and one brand partner. Launch a campus waste collection drive for clean fabric scraps and pilot sorting guidelines. File one utility model or design registration for the pulp blend or process settings if novel.
	Rationale	Bangladesh produces large volumes of garment waste that often goes to landfill or informal burning. Turning clean cotton rich waste into paper keeps material in use and supports a true circular flow. Paper making from textile waste reduces pressure on wood and can cut water and energy use compared to virgin pulp when designed well.

		The university can act as a neutral test bed where engineering, business, and design students co create solutions with industry. The program aligns with UN goals on responsible consumption and production, climate action, and industry innovation. Local brands are seeking low impact packaging and storytelling value. Eco paper from fashion waste offers both. Skills gained include material testing, process control, quality management, and entrepreneurship, which improve student employability.
Subject (Leader)	Initiator(s)	FAISAL, Md. Ariful Hossain.
	Champion(s)	FAISAL, Md. Ariful Hossain.
	Major team member(s)	RAHMAN, Md. Mostafizur; SHAMSUZZAMAN, Md.; HOQUE, Mohammad Bellal
Environment	Nature/Society	This study embodies a multidisciplinary approach that intersects environmental sustainability, material science, and social impact. By repurposing textile waste into handmade paper, it promotes eco-conscious innovation while addressing two majors environmental concerns such as textile pollution and deforestation. The nature of the study is both experimental and solution-oriented, focusing on resource optimization and low-cost production techniques. From a societal perspective, the research offers significant benefits. It creates opportunities for small-scale industries, especially in rural areas, encouraging green entrepreneurship and job creation. Additionally, it supports sustainable development goals by fostering circular economy practices, reducing landfill waste, and raising awareness about responsible consumption and production.
	Industry/Market	This study is directly relevant to the textile, paper, and recycling industries, with strong potential for integration into eco-friendly packaging, stationery, arts and crafts, and sustainable product design markets. As global industries move toward greener alternatives, the demand for biodegradable, handmade, and recycled paper products are steadily rising. This opens up new market opportunities for using textile waste as a raw material in the handmade paper sector. In regions like Bangladesh, home to a large garment industry, this approach offers a viable path for waste valorization, turning industrial byproducts into

		marketable goods. The low-cost production method also supports micro-enterprises and local cottage industries, fostering inclusive economic growth.
	Citizen/Government	This study aligns with national sustainability and environmental goals. Governments can play a pivotal role in supporting this initiative through policy making, financial incentives, and public awareness campaigns. Establishing regulations that encourage textile waste recycling, offering subsidies for eco friendly production methods, and facilitating public-private partnerships will be essential for scaling the use of textile waste in handmade paper production. Additionally, international organizations focused on sustainable development could provide technical assistance and funding to expand this model, especially in developing countries like Bangladesh, where the textile industry is a significant sector.
Resources	Human resources	2 students were involved in the program work
	Financial resources	BDT 150,000
	Technological resources	High-speed blender for pulping textile and paper waste, Wooden sieve/frame for sheet formation, Pressing tools (tiles or boards) to remove excess water, Drying tools such as household irons or sun-drying facilities for final finishing. Other requirements include clean water, workspace for drying, and basic protective gear. No harmful chemicals or advanced machinery are needed, ensuring low energy consumption and environmental friendliness. This simplicity supports easy adoption in both rural and urban areas.
Mechanism	Strategy (Weight/Sequence)	Cottage Industry Development: Promote small-scale paper-making units in rural areas using locally sourced garment waste, creating employment and empowering communities. Partnership with Garment Factories: Collaborate with textile and RMG industries to establish a consistent supply chain for pre-consumer textile waste. Eco-Product Branding: Develop a market for eco-friendly, handmade paper products through sustainable branding, targeting environmentally conscious consumers and businesses. Government and NGO Support: Seek funding or policy support from sustainability-focused government bodies and NGOs to scale operations.

		Educational and Artistic Use: Position the handmade paper for use in schools, art institutions, and craft-based businesses, promoting creative reuse of waste materials.
	Organization	The program sits in the Department of Textile Engineering with a small program office. A steering committee led by the HOD guides the work. Members come from Textile Engineering dept. Named roles: program lead, lab manager. Clear flow: waste collection agreements with nearby factories, sorting on campus, pulping and sheet forming, drying and finishing, quality checks, packaging, and sales to campus and local buyers. Safety and environment checks run through the university lab safety unit.
	Culture	The university promotes a make and learns mindset and accepts early trial and error. Staff and students are encouraged to work across departments and with industry. The campus values sustainability and community service, which supports waste to paper goals. Recognition plan: certificates, an annual Eco Paper Day, and small seed grants for new ideas. Inclusion and safety first: equal access for women and men, safe lab rules, and fair work. Open sharing of results through posters, dashboards, and open lab days. Waste sorting on campus is encouraged so clean textile scraps reach the program. Buyers inside the campus agree to prefer eco paper for notebooks and packaging when quality meets need. Ethical rules apply to all partners, including no child labor and responsible sourcing.
Doing		
Launch date	June, 2024	
Responsible organization	World University of Bangladesh	
Program content and process	The Eco Paper Innovation program transforms pre-consumer fashion waste into eco-friendly handmade paper as a sustainable alternative to wood-based pulp. The process begins with collection and sorting of cotton-rich textile	

	scraps from local garment factories. These materials are cleaned, shredded, and pulped through mechanical and chemical methods adapted for textile fibers. The pulp is blended with natural binders when needed, then sheet-formed using traditional papermaking frames. Sheets are pressed, dried, and finished into paper of different grammages (80–200 gsm) suitable for notebooks, tags, and packaging. Implementation involves three core phases: (1) Resource Mobilization – signing agreements with factories, setting up pilot equipment, and engaging students. (2) Production and Quality Control such as running test batches, optimizing fiber blends, and measuring tensile strength, thickness, and printability. (3) Commercialization and Outreach such as developing branded eco-products, running campus campaigns, and engaging NGOs, schools, and businesses as buyers. The program integrates teaching, research, and entrepreneurship by engaging students in all steps, from process design to marketing. Progress and sustainability metrics (waste diverted, carbon savings, and number of trained students) are tracked to demonstrate impact.
Key highlights of the content/process	Content: Transformation of garment waste into handmade eco paper. Integration of sustainability, engineering, and design learning. Market-oriented product development (notebooks, tags, packaging). Process: Waste collection partnerships with local factories. Pilot production with student participation and lab testing. Branding and outreach to conscious buyers and NGOs.
Differences from traditional approaches	Traditional paper relies on wood pulp, while this program substitutes textile waste. Conventional labs focus only on teaching; this integrates teaching with entrepreneurship. Waste is usually down-cycled or landfilled; here it is up-cycled into value-added products.
Progress as of today	Pilot equipment installed. Agreements with two garment factories for regular waste supply.
Problems in implementation	Inconsistent fiber quality from mixed textile waste. Limited drying space during monsoon season. Initial lack of awareness among students and buyers about eco paper applications.

Approaches to solve the problems	Developed sorting guidelines for waste to ensure fiber consistency. Built low-cost solar dryers to address drying challenges. Conducted awareness workshops and prototype exhibitions to educate students and buyers.
Completion date, if completed	The program is ongoing. Pilot stage is expected to be completed by December 2025, with full commercialization targeted by 2027.
Seeing	
Impacts on students	Students gained real skills in sorting, pulping, sheet forming, testing, costing, and sales. Thirty students joined pilot runs and workshops. Satisfaction score from a short survey was 4.6 out of 5. Six student teams made notebooks, hangtags, and envelopes and showed them on campus.
Impacts on professors	Faculty used the line for class labs and project work. Four faculty members supervised student projects and one joint abstract was submitted to a local event. Staff report better links with industry and new ideas for funded research.
Impacts on university administration	The program supports the campus green plan and the goals on responsible use and climate action. The administration is satisfied because the work improves reputation, gives student jobs, and uses a clear cost center with safety rules. Space and a small seed fund were approved for the current year.
Responses from industry/market	N/A
Responses from citizen/government	N/A
Measurable output (revenues)	N/A
Measurable input (expenses)	N/A
Cost-benefit analysis for effectiveness	N/A
Future Planning	
Where does the project go from here?	secure three more waste supply partners and a steady campus collection stream. Upgrade drying with solar dryers and add a small calendar for better finish. Standardize quality tests and publish a simple manual for fiber selection and process settings. Sign two anchor buyers for regular notebooks and mailers and open a campus store corner. Add a one credit practicum so every term at least forty students learn the line.

	Post monthly data on waste diverted, sheets made, orders delivered, and water saved on a public dashboard. Seek one national grant and one corporate partner to scale to city wide collection and processing within three years.
Addendum	
Exhibits, pictures, diagrams, etc.	
Reports, mimeos, monographs, books, etc.	(Describe the specific documents that validate the program, and list them here.)
Others which may help explain the program (including website links)	(Include any materials that may help validate the program; links to the program's website will be especially useful.)