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SUSTAINABILITY IN HAND WEAVING: ASSESSING ENVIRONMENTAL IMPACTS AND ETHICAL PRACTICES

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Hand weaving, a centuries-old textile tradition, is increasingly recognized as a potential model for sustainable production in the modern textile industry. This study evaluates the environmental, ethical, and socio-economic dimensions of hand weaving across region of Serbia using a mixed-method approach combining life cycle assessment (LCA) and ethnographic field analysis. Quantitative results demonstrate that hand weaving produces up to 70% fewer carbon emissions and consumes 50–80% less energy than mechanized textile manufacturing, particularly when using locally sourced, natural fibres. Qualitative findings reveal strong cultural and ethical benefits, including gender-inclusive employment and heritage preservation; however, persistent challenges such as synthetic dye pollution, market volatility, and insufficient policy support limit the sector's overall sustainability. The study concludes that integrating traditional weaving with eco-innovation, fair-trade certification, and community-based governance can position hand weaving as a viable pathway toward circular and ethical textile production systems.

The textile and apparel industry is among the most resource-intensive and environmentally burdensome sectors globally. Its production chain – spanning fibre cultivation, spinning, weaving, dyeing, finishing, and distribution – consumes enormous quantities of water, energy, and chemicals while generating significant carbon emissions and waste. According to the United Nations Environment Programme (UNEP, 2022), the global textile sector accounts for approximately 10% of total carbon emissions and 20% of global wastewater production [1], [2]. Within this context, hand weaving emerges as a sustainable and ethically grounded textile practice rooted in centuries of artisanal knowledge. Hand weaving involves the manual interlacing of warp and weft yarns using simple or semi-mechanical looms operated without electricity. The process relies primarily on human labour and renewable materials, significantly reducing dependence on fossil fuels and synthetic inputs [3, 4]. Sustainability in hand weaving can be viewed through three interconnected dimensions: environmental, economic, and social. Environmentally, the practice contributes to low carbon emissions, minimal water pollution, and reduced textile waste. Economically, it supports small-scale, community-based production systems that emphasize quality over quantity and encourage circular design approaches. Socially, it fosters fair labour conditions, equitable income distribution, and intergenerational transmission of cultural and technical skills [3-5].

Keywords: *hand weaving, sustainability, environment, ethical practice, life cycle assessment.*