ABSTRACT

Due to the harmful effects of textile production, sustainability has grown into a movement within the clothing industry that aims to enhance fashion design procedures in order to protect the environment. The amount of chemicals, energy, and water used in these operations, as well as the effluent they produce, have a substantial influence on the environment throughout the manufacturing of natural and synthetic fibers through procedures including spinning, dying, weaving, and finishing. Lessening the environmental effects of the textile business is vital due to consumer awareness and Governmental regulations. The present study focused on the sustainability analysis of energy and solid waste streams in denim manufacturing in Pakistan. Using a life cycle assessment methodology, this study assessed the environmental effects of frequently produced and owned clothing articles. The primary environmental effect categories of the material and manufacturing phases are examined in this life cycle assessment study (cradle to gate). In addition, this study contrasts how a pair of denim jeans affects the environment. This master's thesis examined the environmental effects of several impact categories using the Life cycle assessment methodology and the LCA software Gabi. Life cycle assessments were further performed for environmental sustainability in the following 10 environmental impact categories: climate change potential (CCP), global warming potential (GWP), eutrophication potential (EU), acidification potential (AD), respiratory inorganics (RI), human toxicity (HT), water depletion (WO), photochemical ozone formation potential (POFP), terrestrial Ecotoxicity potential (TETP), and particulate Matter ($PM_{2.5}$).Waste recycling, reuse and energy management was also observed in present study. According to results, Climate change potential has highest impact as compared to other impact categories. Results also indicate that reduce, reuse practices can minimize the amount of waste, and energy consumption was reduced by installing solar plants. Denim industry has reduces its energy consumption from 393,686,035 kWh in 2019 to 387,218,256kWh in 2021. The industry is moving towards sustainable approaches to minimize the consumption of energy. Therefore, the present study will also help to better understand the sustainable methods to minimize the energy use and reduce waste quantity to lessen the environmental impacts.