

Sustainable Manufacturing of Concentrated Latex and Ribbed Smoked Sheets in Sri Lanka

Authors : Pasan Dunuwila, V. H. L. Rodrigo, Naohiro Goto

Abstract : Sri Lanka is one the largest natural rubber (NR) producers of the world, where the NR industry is a major foreign exchange earner. Among the locally manufactured NR products, concentrated latex (CL) and ribbed smoked sheets (RSS) hold a significant position. Furthermore, these products become the foundation for many products utilized by the people all over the world (e.g. gloves, condoms, tires, etc.). Processing of CL and RSS costs a significant amount of material, energy, and workforce. With this background, both manufacturing lines have immensely challenged by waste, low productivity, lack of cost efficiency, rising cost of production, and many environmental issues. To face the above challenges, the adaptation of sustainable manufacturing measures that use less energy, water, materials, and produce less waste is imperative. However, these sectors lack comprehensive studies that shed light on such measures and thoroughly discuss their improvement potentials from both environmental and economic points of view. Therefore, based on a study of three CL and three RSS mills in Sri Lanka, this study deploys sustainable manufacturing techniques and tools to uncover the underlying potentials to improve performances in CL and RSS processing sectors. This study is comprised of three steps: 1. quantification of average material waste, economic losses, and greenhouse gas (GHG) emissions via material flow analysis (MFA), material flow cost accounting (MFCA), and life cycle assessment (LCA) in each manufacturing process, 2. identification of improvement options with the help of Pareto and What-if analyses, field interviews, and the existing literature; and 3. validation of the identified improvement options via the re-execution of MFA, MFCA, and LCA. With the help of this methodology, the economic and environmental hotspots, and the degrees of improvement in both systems could be identified. Results highlighted that each process could be improved to have less waste, monetary losses, manufacturing costs, and GHG emissions. Conclusively, study's methodology and findings are believed to be beneficial for assuring the sustainable growth not only in Sri Lankan NR processing sector itself but also in NR or any other industry rooted in other developing countries.

Keywords : concentrated latex, natural rubber, ribbed smoked sheets, Sri Lanka

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