

A Sustainability Benchmarking Framework Based on the Life Cycle Sustainability Assessment: The Case of the Italian Ceramic District

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Abstract : A long tradition in the ceramic manufacturing since the 18th century, primarily due to the availability of raw materials and an efficient transport system, led to the birth and development of the Italian ceramic tiles district that nowadays represents a reference point for this sector even at global level. This economic growth has been coupled to attention towards environmental sustainability issues throughout various initiatives undertaken over the years at the level of the production sector, such as certification activities and sustainability policies. In this way, starting from an evaluation of the sustainability in all its aspects, the present work aims to develop a benchmarking helping both producers and consumers. In the present study, throughout the Life Cycle Sustainability Assessment (LCSA) framework, the sustainability has been assessed in all its dimensions: environmental with the Life Cycle Assessment (LCA), economic with the Life Cycle Costing (LCC) and social with the Social Life Cycle Assessment (S-LCA). The annual district production of stoneware tiles during the 2016 reference year has been taken as reference flow for all the three assessments, and the system boundaries cover the entire life cycle of the tiles, except for the LCC for which only the production costs have been considered at the moment. In addition, a preliminary method for the evaluation of local and indoor emissions has been introduced in order to assess the impact due to atmospheric emissions on both people living in the area surrounding the factories and workers. The Life Cycle Assessment results, obtained from IMPACT 2002+ modified assessment method, highlight that the manufacturing process is responsible for the main impact, especially because of atmospheric emissions at a local scale, followed by the distribution to end users, the installation and the ordinary maintenance of the tiles. With regard to the economic evaluation, both the internal and external costs have been considered. For the LCC, primary data from the analysis of the financial statements of Italian ceramic companies show that the higher cost items refer to expenses for goods and services and costs of human resources. The analysis of externalities with the EPS 2015dx method attributes the main damages to the distribution and installation of the tiles. The social dimension has been investigated with a preliminary approach by using the Social Hotspots Database, and the results indicate that the most affected damage categories are health and safety and labor rights and decent work. This study shows the potential of the LCSA framework applied to an industrial sector; in particular, it can be a useful tool for building a comprehensive benchmark for the sustainability of the ceramic industry, and it can help companies to actively integrate sustainability principles into their business models.

Keywords : benchmarking, Italian ceramic industry, life cycle sustainability assessment, porcelain stoneware tiles

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