ENVIRONMENTAL AND ECONOMIC CRITERIA FOR MULTICRITERIA ANALYSIS OF THERMAL INSULATION MATERIALS ON EXAMPLE OF RECYCLED TEXTILE AND CONVENTIONAL MATERIALS

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Abstract

Making decisions, i.e. the need for them, is constantly present in all areas of human activity, regardless of whether it is an individual, a group of people, a company, a state, etc. Therefore, the scientific study of the decision-making process, i.e. the development of decision-making theory as a separate scientific discipline, is fully justified. In real problems, requirements are often set for the achievement of multiple interrelated goals, where each individual goal is influenced by a large number of factors. Therefore, the decision is made by analyzing the most important factors at the moment - choosing the appropriate criteria and the desire to achieve as many goals as possible at the same time. a key role in MCDA analysis is the selection of appropriate criteria that should provide quantitative or qualitative information in a simple and clear way. The textile industry is the second most environmentally polluting industry in the world after the petroleum industry. Approximately 25% of global chemicals are used in textile production, around 10% of the world's CO_2 emissions are generated by the textile industry, and it consumes more water than any other industry. Annually, about 92 million tons of textile wastes are produced, with only an estimated 10-30% of the waste being recycled. Textile waste can be reused or recycled using various methods for thermal insulation materials.

The aim of this study is to analyze and compare recycled thermal insulation materials with conventional thermal insulation materials based on economic and environmental criteria. By using the DEXi software tool, a multicriteria analysis was conducted between recycled textile and conventional thermal insulation materials based on economic and environmental criteria. In terms of economic and environmental criteria, conventional thermal insulation materials have an advantage over thermal insulation materials made from recycled textiles.

In conclusion, the decision on which option is better depends on the specific requirements of the project. If sustainability is a key priority, based on all available information, thermal insulation made from recycled textiles is the better choice. However, if priorities are focused on heat insulation, moisture resistance, and durability, EPS is currently the better option. According to the planned scenario, there is a possibility that the efficiency of both thermal insulation materials can be balanced through additional research and improvement.

Keywords: *multicriteria analyses tools, DEXi, recycling, thermal insulation, EPS, textile industry, environmental pollution.*