

A decision support tool based on DEA and AHP for evaluating solar PV
industry

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Abstract

As technology advances, various energy resources decline sharply. In addition to the fluctuations in commodity prices, a heavy burden on the environment is resulted, and this brings climate changes, environmental degradations, etc. Therefore, how to make good use of natural resources and develop other energy sources becomes a global priority. The biggest challenge faced by Taiwan's solar power industry is the lack of economic competitiveness of renewable energy compared to traditional energy sources, and the industry must rely on the government's financial support. In recent years, because of global environmental consciousness and energy shortages, people have started to focus on new alternative energies, and solar power industry will become one of the most brilliant new energy industries. Taiwan has been successful in developing the semiconductor and the TFT-LCD industries over the past ten years, and the solar industry has a manufacturing process similar and simpler to the two industries. With the solid technology foundation of the two manufacturing processes, Taiwan can achieve a favorable development as a result of increasing global demand for renewable energy. Currently, the manufacturing cost of solar cells is still very high, and the power conversion efficiency is low. Therefore, companies must continue to invest in research and development, commit to product differentiation, achieve economies of scale, and consider the possibility of vertical integration, in order to strengthen their competitiveness and to acquire the maximum benefit from the solar market. This study combines data envelopment analysis (DEA) and analytic hierarchy process (AHP) to evaluate the operating efficiency of crystalline silicon solar firms, and the results will provide businesses to understand their strengths and weaknesses and business direction to improve future operations.

Keyword : Solar cells, TFT-LCD, data envelopment analysis (DEA), analytic hierarchy process (AHP)