

An integrated model to evaluate the performance of solar PV firms

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## Abstract

The use of renewable energy resources is being stressed in the 21st century due to the depletion of fossil fuels and the increasing consciousness about environmental degradation. Renewable energies, such as wind energy, fire energy, hydropower energy, geothermal energy, solar energy, biomass energy, ocean power and natural gas, are treated as alternative means of meeting global energy demands. After Japan's nuclear plant disaster in March 2011, people are aware that a good renewable energy resource not only needs to produce zero or little air pollutants and greenhouse gases, it also needs to have a high safety standard to prevent the chances of hazards from happening. Solar energy is one of the most promising renewable energy sources with an infinite sunlight resource and environmental sustainability. However, photovoltaic products currently still require a high production cost with low conversion efficiency. In addition, the solar industry has a rather versatile market cycle in response to economic conditions. Therefore, solar firms need to strengthen their competitiveness in order to survive and to acquire decent profits in the market. This research proposes a performance evaluation model by integrating data envelopment analysis (DEA) and analytic hierarchy process (AHP) to assess the business performance of the solar firms. From the analysis, the firms can understand their current positions in the market and to know how they can improve their business. A case study is performed on the crystalline silicon solar firms in Taiwan.

Keyword : Analytic hierarchy process (AHP): Data envelopment analysis (DEA): Fuzzy set: Solar cells.