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Historical Assessment of Land Use Policies Depending on Food Security: A Multi-Criteria Decision Making Experiment

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Abstract

The current study investigates historical achievements of land use policies in order to ensure food security in the context of selected European countries. The selected countries are Germany, France, Netherlands and Turkey and include the years 1980, 1990, 2000 and 2013. Various agro-economic and environmental indicators are tested in current research to measure agricultural sustainability as well. These indicators are per capita cereal production, per capita meat production, per capita milk production, yield of cereals, gross agricultural production value, fertiliser and pesticide use efficiency, and total agricultural emission. The study attempts to rank the countries according to sustainability criteria. In the studies of ranking, Multi Criteria Decision Making (MCDM) methods are best suited for effectively dealing with a number of multifaceted evaluation criteria. The use of a MCDM method usually involves asking experts to express their opinions in terms of criterion selection and weighing according to their knowledge, experiences, and special concerns. TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) method was used to rank the countries according to abovementioned criteria in terms of successful land use policies in a historical way. According to TOPSIS results, in 1980 the country which was closest to the ideal solution was Turkey with 0.75 points, and the Netherlands was the country which farthest from this ideal solution with 0.24 points. Germany and France had 0.56 and 0.74 points, respectively. As for 2013, France, with 0.59 points, was a country that was closest to ideal solution. Turkey, the Netherlands and Germany had 0.476, 0.469 and 0.466 points, respectively. Statistically, European lands seem to be poor in terms of excessive use of pesticides and inorganic fertilisers. Also the contributions to global climate change, due to agricultural production, have been increased. Thus, EU's agricultural production might be shifted to the 10+2+1 countries that newly joined the Union. Agricultural products processing industry is more developed in the EU-15 countries if compared to resuming countries in the EU. The success of the Netherlands and Germany on this topic is clear. A “pollution tax” in agriculture might be applied to European countries that have poor agri-environmental management systems.

Keywords: Land use policy, multi criteria decision making, sustainability, TOPSIS