A Knowledge Based Fuzzy Analytic Network Process for Sustainable Manufacturing Indicator

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Abstract:
Sustainable manufacturing is a relatively new but a very complex manufacturing paradigm as it encompasses three interdependent sustainability dimensions of economic, environmental and society. To embark on the essence of sustainable manufacturing, the development of sustainability indicators needs to be highlighted. Regrettably, there are only a few standardized indicator mechanisms which can suit specific requirements of various manufacturing organizations. Hence, this research proposes a novel Knowledge-Based Fuzzy Analytic Network Process (KBFANP) system which are able to assist the decision-making process of sustainable manufacturing by the development of a new indicator mechanism. The KBFANP system consists of four major phases, namely Initialization, Selection, Evaluation and Prioritization. The system integrates the advantages of Knowledge-Based System, Fuzzy Set Theory and Analytic Network Process into a single unified standardized indicator, which is applicable to all types of manufacturing settings. The system is developed, implemented and analyzed on two manufacturing companies. The proposed KBFANP system can be made as the advisory Decision Support System which is able to provide solutions on the areas that need improvement, with different levels of priority.

Keywords : Sustainable Manufacturing Indicator; Knowledge-Based System; Fuzzy Analytic Network Process

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