

Research Statement

Updated: 2023-02-05

My main research interests lie in the areas of innovation management, multiple-criteria decision making (MCDM) methods with/no fuzzy logic; analytic hierarchy process (AHP), analytic network process (ANP), simulation of discrete manufacturing systems, new product development, concept evaluation, and computer integrated manufacturing. I strongly believe that the interplay of these elements provides a very fruitful and challenging research domain, both from a theoretical and practical viewpoint.

As part of my Ph.D. dissertation, I worked on the development of “a step-by-step implementation model of a computer integrated manufacturing (CIM) system and its analysis using simulation technique”. Because; manufacturing organizations in the developing countries are under intense competitive pressures. Major changes are being experienced with respect to resources, markets, manufacturing processes, and product strategies. As result of international competition, only the most productive and cost-effective industries will survive. That’s why; in this study, a systematic structure for a step-by-step implementation and analysis of a computer integrated manufacturing (CIM) system consisting of various computer-aided systems (CAx) systems is described, where analytic hierarchy process (AHP), simulation and benchmarking techniques are used effectively together. As AHP technique is used for the evaluation and selection of the hardware and software components for a CAx system to be implemented in a company, a simulation generator integrated with this technique is used for further analysis to measure its benefits on company’s modelled production organization. In final part of the study, the proposed model was applied to a company, Makina Takım Endüstrisi A.Ş., a leading company on design and manufacturing all kinds of cutting tools in Turkey, as a case study in order to prove its applicability on a real-life system. As the result of the study, the following article was produced and published in a SCI-indexed journal;

Ayag, Z. (2002) “An analytic-hierarchy-process based simulation model for implementation and analysis of computer-aided systems”. *International Journal of Production Research*, Vol.40, No.13, 3053-3073.

Moreover, I have an interest in new product development environment; for instance, I have been working on how to evaluate concept design alternatives through multiple-criteria decision making methods and fuzzy logic.

In addition, I have published many articles in the leading journals, such as International Journal of Production Research, Journal of Intelligent Manufacturing, IIE Transactions, Journal of Engineering Design and Journal of Intelligent and Fuzzy Systems and so on. I have also given many seminars on my interest fields with numerous publications in conference and congress proceedings.