A Two-dimensional Warranty Model with Consideration of Customer and Manufacturer Objectives Solved with Non-dominated Sorting Genetic Algorithm

Warranty is a powerful implement for marketing strategy that is used by manufacturers and creates satisfaction for consumers by ensuring to compensate for incorrect operation of the product. Warranty service results in a cost named warranty cost for a manufacturer. This cost is a function of warranty policy, regions, and product failures pattern. Since this service covers the cost of uncertain failure of the product, it makes some utility for customers. In this paper, we developed a novel customer utility function that is used as a customer objective to be maximized. In addition to the manufacturer objective, minimizing the warranty cost is considered simultaneously. There are four restrictions on warranty parameters such as time, usage, unit product price and the R&D expenditure to be considered. Finally, we will propose a novel bi-objective model that maximizes the utility function for customers and minimizes the warranty cost for the manufacturer. This model will be solved with an evolutionary algorithm called Non-Dominated Sorting Genetic Algorithm (NSGA-II) and non-dominated Pareto solutions will be gained from this method. To give a numerical instance, for a certain usage rate’s range of customers, different warranties are provided and compared. It is believed that the computational results can help manufacturers to determine optimal solutions for the objective functions and consequently warranty parameters.

Keywords:
- Two dimensional warranty, utility function, Warranty cost, Bi-objective model, NSGA II

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