

## Managing Warranty Reserves

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Manufacturers routinely use warranties on their products to increase sales. Warranties give customers specific rights, and limits manufacturers' liabilities. The manufacturer is expected to service the items under warranties according the warranty contract. In this presentation we will look at several aspects of the warranty problem.

1. **Warranty Cost Evaluation: Single Item:** The first issue is to evaluate the cost of the warranty: its mean, variance, and distribution. It can be used by the manufacturer to decide how much to charge for it, and by the customers to decide whether the cost is worth it.
2. **Warranty Cost Evaluation: Product Line:** The manufacturer also needs to know how much warranty liability he is assuming for the whole product line. This can be used to decide upon the funding of the warranty reserve.
3. **One-Time Funding of the Warranty Reserve:** Under this scenario the manufacturer sets aside a fixed amount at the beginning to cover the warranty liabilities arising out of a whole product line. How much reserve should there be to begin with?
4. **Continuous Funding of the Warranty Reserve:** Under this scenario, the manufacturer seeds the reserve with an initial amount, but adds to it a fraction of each sale as it occurs. How does one decide upon the funding level, and the fraction contribution?
5. **Continuous, Dynamic Funding of the Warranty Reserve:** This is same as the previous scenario, but additionally, the manufacturer can add or subtract funds at regular intervals (say every quarter).
6. **Warranty Outsourcing:** The manufacturer may decide to outsource the warranty processing. How does this affect the warranty reserve management?

A general reference for the warranty literature is the excellent book by Blischke and Murthy [1]. Eliasberg et al [2] formulate the warranty reserve problem as an optimization problem. In this presentation we discuss the stochastic models to address the above issues.

## References

- [1] W. R. Blischke and D. N. P. Murthy. *Warranty cost analysis*. Marcel Dekker, Inc., 1994.
- [2] Jehoshua Eliashberg, Nozer D. Singpurwalla, and Simon P. Wilson. *Calculating the warranty reserve for time and usage indexed warranty*. Management Science, 43, No.7, 966–975, 1997