

Master Thesis Proposal

Choice-Based Product Quality and Service Design: Estimation and Optimization

Many companies sell tangible products and offer ancillary service to support their tangible products. For example, Dyson sold Cinetic Animal with a 5-year factory warranty and Amazon sold Fire HD 10 with a 1-year factory warranty. While such ancillary services increase the attractiveness of tangible products, they add complexity to the product line design. The crux of this complexity lies in the intrinsic link between the quality of a tangible product — reflected in its production costs — and the associated service costs (i.e., maintenance expenses during the service period). Specifically, a high-quality product incurs greater production costs but is less prone to malfunction, leading to lower service costs. A low-quality product may have lower initial production costs but is more susceptible to failure, which could result in higher service costs over time. Therefore, a firm must carefully consider both product quality and service warranty length as interconnected decisions in the design process.

The objectives of this master thesis are to:

- review the literature on product service management and product quality design,
- develop a discrete choice model that captures the attractiveness of product quality and service warranty length,
- conduct an experiment (e.g., a conjoint experiment) to estimate this discrete choice model,
- apply the estimated discrete choice model to a joint optimization problem of product quality and service warranty length design,
- provide open research gap and future trends.

Selected Literature Recommendations

Wang, R., Ke, C., & Cui, S. (2022). Product price, quality, and service decisions under consumer choice models. *Manufacturing & Service Operations Management*, 24(1), 430-447.