

Product Line Design with Customization in the Presence of Demand Uncertainty

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Abstract : In this paper, we analyze a product line design problem faced by a manufacturing firm where the product line consists of a customized product in addition to a standard product and is offered in a market in which customers are heterogeneous on aesthetic attributes of the product. The customization level of a product is defined by the fraction of aesthetic attributes of the product that the manufacturer chooses to customize. In contrast to the existing literature on product line design that predominantly assumes deterministic demand, we consider the presence of demand uncertainty and frame the product line design problem in a single period (news vendor) setting. We examine the effect of demand uncertainty on product line decisions. Furthermore, we also examine how product line decisions are influenced by channel structure. While we use the centralized channel as a benchmark, we consider the decentralized dual channel where the customized product is sold through an online channel owned by the manufacturer and the standard product is sold through a retailer. We introduce a supply contract between the manufacturer and the retailer for improving channel efficiency and coordinate the distribution channel.

Keywords : product line design, demand uncertainty, customization level, distribution channel

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