Abstract

Ever growing demand for differentiated products resulting in niche market segments, fluctuating raw material costs, and intense market competition have been driving manufacturers across the globe operating in diverse market segments to adopt an optimal new product introduction (NPI) strategy. NPI holds a pivotal role in sustained profitability of enterprises operating in industry segments such as automobiles, construction equipments, and consumer electronics. Product design concept selection, product line design and product commercialization are the three important stages in NPI that have the biggest impact on the organizational targets of an enterprise. Further, with increasingly dynamic consumer requirements, differentiated consumer preferences, choices and biases need to be incorporated in the integrated NPI strategy of enterprises.

Development of enterprise and consumer centric product design concept selection framework is the first stage of our research. Typically concept selection refers to selection of optimal design concept from a number of design alternatives. In our research, we have evolved an integrated framework for product design concept selection that aids product managers to choose such a product design concept that minimizes the overall enterprise risk. A mathematical measure "Overall Enterprise Risk Index (OERI)" is evolved that encapsulates considerations of all functional agencies within the enterprise and aspects related to customers to converge at an optimal product design concept.

Thereafter, enterprise and consumer centric product line design framework is evolved that forms the second stages of our work. Product line design primarily pertains to offering right product attributes with right attribute level (s) in the right product profile within a market segment. In this framework, the functionality of different product attributes of a multi-attribute product is linked to the commercial objectives of the enterprise. Platform loss cost concept captures customer's related cost considerations.

Finally, consumer review and enterprise driven mathematical framework is devised that links the quantitative and qualitative aspects of product features within the realm of product commercialization. Product commercialization is primarily characterized by

upgrading/launching product features aimed at meeting customer's preferences, while at the same time enabling the enterprise to achieve its major commercial objectives. This framework yields decisions pertaining to offering which product features to offer in which period of a planning horizon.

The three devised mathematical frameworks are illustrated through a real life case example of operator cabin of heavy construction machinery. Our focus has been on the development of the conceptual frameworks, hence the superiority of results are not claimed. Better results can be yielded with application of other heuristics/algorithms.

Keywords: Product concept selection, product line design, product commercialization, NPI, consumer review, product feature, and product attributes.