A STUDY OF DEMAND MODELS FOR RETAIL ASSORTMENT PLANNING: A RETAILERS PERSPECTIVE

By

Alok Kumar Singh

2009 FPM 03

A Doctoral Dissertation Submitted for partial Fulfilment of the requirements for the

Fellow Programme in Management

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Abstract

A retailer assortment is defined as the mix of products carried by a retail store. The identification of proper assortment has become difficult in the current consumer centric environment. The increasing need of consumers in terms of variety has increased the difficulties for the retailers. The consumers have different preferences of products and retailers must offer the array of products that satisfies the needs of various consumers (Ulu, Honhon, & Alptekinoğlu, 2012). The purpose of selecting a subset of products from the available products is to maximize the retailers objective e.g. profit, under consideration of constraints like limited space available for display, defined budget for the number of products and their SKU's, inventory to be carried to meet a desired service level and last but not the least to fulfil the ever changing needs of the consumers. Assortment planning (AP) is a process of selecting types and number of product to be kept from a given product line and also to determine the optimal level of inventory of these products. The critical issue faced by the retailer in the process of AP is to estimate the demand for each product and further using these demand estimates to develop a profit function and choosing the best array of products to maximize profit under various constraints (Rajaram, 2001).

Assortment planning has been the focus of numerous industry studies. It is very important for any retailer to efficiently manage the process of assortment planning. Poor assortment planning may lead to markdown costs due to excessive inventory of un-demanded products and lost sales due to rapid sell-outs of popular products. Product differentiation exists when within a group of goods, the products are very similar but not identical to each other and they can't be considered in different product class (K. Lancaster, 1975). In

a retail business, the products being offered are classified in categories, sub-categories and further the decision is taken on the number of SKU's to be kept in different sub-categories. Sometimes the decision is also taken on the number of brands to be kept in a given sub-category. The numbers of categories is also referred as width of the assortment while the number of sub-categories is called depth of the assortment. The assortment optimization problem in the literature varies because of the type of demand models considered by the authors, the type of products considered in the study or because of the context of the problem considered.

Assortment planning in a retail chain largely depends on the estimation of demand of various products under consideration. Knowledge of the true demand rates and substitution rates is important for the retailer for a variety of management decisions such as the ideal assortment to carry, how much to stock of each item, and how often to replenish the stock (Anupindi, Dada, & Gupta, 1998). The demand of a given product comprises not only to its self-demand, but also the demand generated due to either the availability of poor substitution or unavailability of other similar products in the category. Thus, willingness of customer to switch to some other products is a major factor for assortment planning in retail.

Most of the earlier works in retail demand estimation are analytical and there is lack of literature on empirical studies. The application of the models developed and the estimation of various parameters used in the analytical work is also lacking. In the present study, the validity of the demand models has been checked. Also, the behaviour of the two demand models viz. Space elastic demand and multinomial logit models has be studied in two different retail categories. The study has been carried in a hyper store of a

big Indian retail chain. The demand using these models has been forecasted for the selected products and then has been compared with the actual demand obtained from the store. A suitable model for demand estimation for given products has been suggested from the study.

The results obtained from the work indicate that both the demand models are valid in the given context. The results also indicate that out of the two models, the space elastic demand model is forecasting better than the MNL model for both the product categories. A retailer being given option will opt for the space elastic demand model. The lower significance of cross space elasticity in demand estimation for space elastic demand model is consistent with previous research.

Keywords: Retail, Assortment Planning, Space elastic demand model, Multinomial logit model, Direct space elasticity, Cross space elasticity

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