

The Hong Kong Polytechnic University
Department of Logistics and Maritime Studies
Research Seminar

**Three Studies on Behavioral Operations Management in E-commerce:
Return Policy, Labor Delivery, and New Retail**

by

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(Conducted in English)

Abstract:

Behavior-based analysis and strategy are advantageous to firms by enabling them to improve the marketing effectiveness. Although Behavioral Operations Management (BOM) has attracted the attention of researchers for a decade, many aspects are still left for research due to the complexity of human behavior and the development of technology, especially in e-commerce. In this thesis, we conduct three studies on BOM in e-commerce, considering different behavioral aspects in terms of return policy, labor delivery, and new retail.

In the first study, we develop a series of consumer-valuation-based models to investigate the pricing and return policies of the sellers in a competitive e-commerce market. A novel two-dimensional valuation structure is built, which considers the valuations of a consumer on two products and the valuation differentiation of all consumers on each product. We consider both monopoly and duopoly (competitive) markets. In each market, two models are respectively developed, one with and one without the return policies. We derive the optimal or Nash equilibrium solutions for the four models, and conduct some analytical and numerical investigations. The results show that return policy with a partial refund is always chosen by the sellers in both monopoly and duopoly markets. Return policy benefits the seller in a monopoly market, but may not benefit the sellers in a duopoly market. In the duopoly models, one seller can be considered as the seller in the monopoly model who meets a new competitor. The seller's prices and revenues in the duopoly market are respectively lower than those in the monopoly market. Besides, the equilibrium prices in the duopoly models cannot be lower than 80% of the corresponding optimal prices in the monopoly models, which indicates that a monopoly seller will reduce its price by no more than 20% when there comes a competitor. Counter-intuitively, the monopoly seller will also reduce its refund proportion to consumers when it meets a competitor in the market.

In the second study, we focus on the labor participation behavior for the product delivery under fluctuating demand in e-commerce. We consider a model with peak and non-peak periods, where two wages are offered to the labors respectively. The labors are heterogeneous in their opportunity costs, and choose to participate in the product delivery or not by themselves. We first find the optimal wage decisions in the peak and non-peak periods to maximize the profit. Based on the optimal wages, we can determine the number of participating labors, their utilizations, and performance of the logistics system. Then we analyze the impact of the parameters, such as labor pool size, demand, labors' opportunity costs and consumer elasticity of delivery speed, on the optimal wage decisions.

In the third study, we consider "new retail" in e-commerce. The concept "new retail" is to establish an offline channel and integrate it with the online retail channel. The development of new retail encounters three main problems: locations of the offline stores, the price competition with the other traditional online retail, and the difficulty in consumer recognition in the two channels. We present a duopoly model consisting of a new retail firm and an online firm, which sell the same product in two periods. The two firms compete for the market share using the behavior-based pricing (BBP), which means that in the second period each firm offers different prices to consumers with different purchasing histories/behaviors in the first period. We also solve the benchmark model, where the histories/behaviors are not considered. The results provide valuable insights into the development of new retail in e-commerce. In the Nash equilibrium, prices of the new retail firm are higher than the corresponding prices of the online firm due to a higher channel cost for the offline stores and high-speed deliveries. Under certain condition, the new retail firm will establish an offline channel with a larger hassle cost (a measure of the easiness of reaching the offline stores by the consumers) in the BBP model than that in the benchmark model. Interestingly, the difficulty in consumer recognition results in that the new retail firm occupies more market share and may obtain a higher profit than that when the consumers are all recognized.

Bio:

Ms Xuan WANG received her Bachelor Degree (2014) in Industrial Engineering from Nanjing University. She is currently pursuing her Doctor of Philosophy under the supervision of Prof. Chi To Daniel NG.

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All are welcome!