

Public summary of PhD-thesis of Taher Ahmadi

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Customer discounts lead to better Advance Demand Information

A supply chain contains all the activities that businesses go through to deliver their products or service to their customers. The car we drive, the medicine we take, the bread we eat every day – they all come through a supply chain with the customer at the very end. The final goal of every supply chain is satisfying customers by providing high quality service at a reasonable price. However, customer demand is unpredictable. Businesses can never know exactly how much of a product or service they will need to provide. That leads either to shortage of supply (when customer demand is more than the available supply) or surplus of supply (when customer demand is less than supply). Both situations are costly for the business. If there is a shortage, waiting customers may become unsatisfied. The costs associated with this are called shortage costs. In the surplus situation, the business has to keep an inventory of unsold products, and storage costs money. These costs are called inventory holding costs. The age-old question is: how can businesses make a good trade-off between supply and customer demand, so the sum of shortage and inventory holding costs is as small as possible?

Researchers and practitioners have tried to provide novel ideas to make this trade-off more and more efficient. Advance Demand Information (ADI) is one of those ideas: customers telling a business or supplier that they want a specific product on a specific date in the future. Researchers assume that customers provide ADI because it is beneficial to themselves: the desired product will be available when they need it. This might be the case for exclusive products. In most cases, however, customers can find the same product at another supplier.

The research in this thesis makes the idea of ADI more useful to more businesses by suggesting giving the customers a discount to encourage them to tell the supplier in advance what they want. This gives the supplier more time to process the customer order without keeping too much inventory on one hand and without facing shortage of the product on the other. However, giving a discount might destroy the profitability of the supplier. In this analysis, we examined the profitability of ADI in different supply chain structures, from simple to more complicated ones. It turns out that there is a threshold value for the discount, which guarantees a better tradeoff between holding and shortage costs compared to a case where there is no discount. Using this threshold value, the supplier can decide on how and when to reorder the product (the replenishment policy) and how much ADI is needed (the preorder policy) so the total cost to the supplier is as small as possible. We also analyzed the system in the situation where replenishment and preorder is subject to a time-based service constraint. We found that the value of ADI is more highlighted for suppliers aiming to deliver fast service or to serve a big portion of the customers.

Title of PhD-thesis: Inventory control systems with commitment lead time. First supervisor: Prof. Ton de Kok, TU/e; Second supervisor: Prof. Ivo Adan, TU/e; Co-supervisor: Dr. Zumbul Atan, TU/e.