

Abstract

This thesis is concerned with studies on some aspects of supply chain coordination sometimes referred to as channel coordination. Supply chain coordination is concerned with the development and implementation of strategies to align the business processes and activities of the members of the supply chain to ensure better supply chain performance in terms of costs, delivery time and customer service.

For specific supply chains and coordination strategies, we develop here analytical models for coordination. We have first considered a two-stage supply chain coordination problem. The supply chain consists of a manufacturer and a buyer. For a supply chain where the partners share complete information and when they do not share, using credit as incentive, analytical models have been developed to have channel coordination. For a supply chain where there is information asymmetry, we have discussed a negotiation procedure for division of surplus due to coordination between the supply chain partners. Later on, the problem of coordination under asymmetric information is extended to a situation where the manufacturer has finite production rate.

Using all unit quantity discount as incentive mechanism for supply chain coordination, models have also been developed. Finally, a comparative study of two incentive mechanisms namely credit policy and all unit quantity discount policy is made.

Third problem considers two policies. While the first is a non-coordinated policy where the manufacturer produces an integer multiple of buyer's economic lot size, the second is a coordinated policy where manufacturer produces in integer multiple of a negotiated order quantity of the buyer. The later uses credit for supply chain coordination. A comparative study of two clearly shows that a coordinated solution with credit option is superior to a non-coordinated solution.

The fourth problem deals with a simple two-stage supply chain consisting of a manufacturer and multiple buyers where transportation cost is high. Two delivery modes namely ex-site and ex-factory are considered in the development of analytical models of supply chain coordination.

The fifth and the last problem presented in this thesis deals with a three-stage supply chain coordination problem where the capacity of the manufacturer is bottleneck for the supply chain. The analytical model for this supply chain studies the impact of manufacturer's capacity bottleneck on supply chain coordination.

For all the problems, mathematical models and solution methodologies have been developed and each model is illustrated with the help of a numerical example. Analysis of the results obtained shows that supply chain coordination leads to reduction in total supply chain cost and increase in supply chain efficiency.

For the purpose of presentation, this thesis is divided into seven Chapters. The first Chapter gives an introduction to the thesis. The second Chapter gives a brief review of literature. The next five Chapters present the five problems. In the last Chapter of this thesis, we have presented summary and conclusions of the thesis besides some problems that have scope for further research. List of reference is given at the end of the Chapters.

Key words: Supply chain, Inventory, Economic Order Quantity, Information asymmetry, Negotiation.