Abstract

It is felt in recent academic literature and industry circles that incentive problems arise in a decentralised supply chain. In a decentralised supply chain, the manager of a Decision Making Unit (DMU) is held accountable for a set of activities and is evaluated on a performance measurement scheme. Literature on incentive issues in operations suggests that this scheme should be such that it makes the managers take those decisions that are in the best interests of the supply chain. The first part of thesis involves the study of a distribution system. This is used as a building block to explore the performance measurement scheme within this distribution system under a decentralised control. The distribution system consists of one central warehouse and multiple distribution centres. Demand arises at distribution centres and central warehouse supplies goods to the distribution centres using a fixed number of trucks. The costs of transportation, inventory and backorder are captured in the distribution system. The process of investigation of the distribution system is carried out using mathematical programming and is analysed under centralised as well as decentralised setting. The centralised setting considers the entire distribution system (i.e. central warehouse and distribution centres) as one unit for decision making. Decentralised setting considers the central warehouse and distribution centres as separate Decision Making Units. In the second part of thesis, a multiple parameter penalty cost scheme is explored for incentive compatibility. In this study, the definition of incentive-compatible is taken to be the one that brings performance of the distribution system under a decentralised setting closest to a centralised setting. Penalty costs are specifically for internal purpose and are a means of incentive compatibility. The values of penalty costs that bring the performance of the distribution system (under a decentralised setting) closest to that of a centralised setting are identified using an experimental methodology.